2   Docket No. NAN-105XC1
                     Serial No. 09/833,833

In the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application..

Claim 1 (currently amended)

A method of manufacturing a plastic optical transmission medium with a radially varying refractive index, comprising:

preparing a polymeric tube having at least two concentric cylinders of polymeric material, wherein at least one of said at least two concentric cylinders of polymeric material comprises a diffusible additive which modifies the refractive index of said at least one of said at least two concentric cylinders of polymeric material;

surrounding said polymeric tube with an outer tubing, wherein said outer tubing has a higher glass transition temperature than any of said at least two concentric cylinders of polymeric material;

heating said polymeric tube surrounded by the outer tubing to a temperature which is below the glass transition temperature of the outer tubing and above all of the glass transition temperatures of said at least two concentric cylinders of polymer material, wherein such heating causes diffusion of the diffusible additive in said at least one of said at least two concentric cylinders of polymeric material, wherein such diffusion of the diffusible additive modifies the radial refractive index of said polymeric tube,

wherein the method is continuous.

Claim 2 (original)

The method according to claim 1, wherein the diffusible additive is nonpolymerizing.

Claim 3 (original)

The method according to claim 1, wherein said polymeric tube comprises an inner cylinder of polymeric material and an outer cylinder of polymeric material, wherein said inner and outer cylinders are concentric.

J:\NAN\105XC1\Amendment #1.doc\DNB/gld

Claim 4 (original)

The method according to claim 3, wherein said inner cylinder of polymeric material comprises a diffusible additive which raises the index of refraction of said inner cylinder of polymeric material.

Claim 5 (original)

The method according to claim 3, wherein said outer cylinder of polymeric material comprises a diffusible additive which lowers the index of refraction of said outer cylinder of polymeric material.

Claim 6 (original)

The method according to claim 3, wherein said polymeric tube comprises a middle cylinder of polymeric material which is between, and concentric with, said inner cylinder of polymeric material and said outer cylinder of polymeric material.

Claim 7 (original)

The method according to claim 6, wherein said inner cylinder of polymeric material comprises a first diffusible additive which raises the index of refraction of said inner cylinder of polymeric material and said outer cylinder of polymeric material comprises a second diffusible additive which lowers the index of refraction of said outer cylinder of polymeric material.

Claim 8 (original)

The method according to claim 7, wherein said method produces a polymeric tube having an approximately parabolic radial index of refraction profile.

Claim 9 (original)

The method according to claim 1, wherein preparing a polymeric tube having at least two concentric cylinders of polymeric material comprises

J:\NAN\105XC1\Amendment #1.doc\DNB/gld

4   Docket No. NAN-105XC1
                                        Serial No. 09/833,833

preparing a corresponding at least two polymeric materials under pressure, wherein at least one of said at least two polymeric materials comprises a diffusible additive which modifies the refractive index of said at least one of said corresponding at least two polymeric materials;

injecting said corresponding at least two polymeric materials into an extrusion die, wherein said polymeric tube having at least two concentric cylinders of polymeric material is extruded from said die.

Claim 10 (original)

The method according to claim 9, wherein heating said polymeric table surrounded by the outer tubing comprises winding the extruded polymeric tube onto a drum, wherein the drum is located within a heated enclosure.

Claim 11 (original)

The method according to claim 1, wherein said at least two concentric cylinders of polymeric material comprise the same kind of polymer.

Claim 12 (original)

The method according to claim 1, wherein at least two of the at least two concentric cylinders of polymeric material comprise different kinds of polymers.

Claim 13 (original)

The method according to claim 12, wherein the two different kinds of polymers have refractive indices n_1 and n_2 such that $n_1 > n_2$, wherein two non-polymerizing additives with refractive indices n_1' and n_2' such that $n_1' > n_1$ and $n_2' < n_2$ are added with the two different kinds of polymers, respectively, and wherein the plastic optical transmission medium has a refractive index profile which is substantially parabolic.

J:\NAN\105XC1\Amendment #1.doc\DNB/gjd

PAGE 6/13 * RCVD AT 8/2/2004 6:34:12 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/0 * DNIS:8729306 * CSID:352 372 5800 * DURATION (mm-ss):07-20

5   Docket No. NAN-105XC1
                                     Serial No. 09/833,833

Claim 14 (original)

The method according to Claim 12, wherein the two different kinds of polymers have refractive indices n_1 and n_2 such that $n_1 \geq n_2$, wherein a non-polymerizing additive with the refractive index $n_2^!$ such that $n_2^! < n_1$ is added with the polymer having refractive index n_2, and wherein the plastic optical transmission medium has a refractive index profile which varies only over a short distance around the interface between the two polymers.

Claim 15 (original)

The method according to Claim 12, wherein the two different kinds of polymers have refractive indices n_1 and n_2 such that $n_1 \geq n_2$, wherein a non-polymerizing additive with the refractive index $n_1^!$ such that $n_1^! > n_1$ is added with the first polymer having refractive index n_1, and wherein the plastic optical transmission medium has a refractive index profile which varies only over a short distance around the interface between the polymers.

Claim 16 (original)

The method according to Claim 1, wherein the polymeric tube comprises three concentric cylinders of polymeric material comprising a first, second, and third polymer, respectively, with refractive indices n_1, n_2, and n_3 such that $n_1 > n_2 > n_3$, wherein the first and third polymers have added non-polymerizing additives with refractive indices $n_1^!$ and $n_3^!$ such that $n_1^! > n_1$ and $n_3^! < n_3$, wherein the plastic optical transmission medium has a refractive index profile which is substantially parabolic.

Claim 17 (original)

The method according to claim 1, wherein the polymeric materials are melt-processable, amorphous materials.

Claim 18 (original)

The method according to claim 1, wherein the polymeric materials comprise a material selected from the group consisting of: polymethylmethacrylate, polyphenylmethacrylate,

J:\NAN\105XC1\Amendment #1.doc\DNB/gjd

polytrifluoroethylmethacrylate, polycarbonate, polyfluoroacrylates, amorphous fluorinated polymers; poly 2,2-bis (trifluoromethyl)-4,5 difluoro 1,3-dioxoline-cotetrafluoroethylene, or poly 2,2,4,5-tetrafluoro 1,3-dioxol-4,5-yl tetrafluoroethylene.

Claim 19 (original)

The method according to claim 1, wherein at least one of the diffusible additives increases the refractive index of organic polymers and is selected from the group consisting of: benzophenome, biphenyl, 3-phenyltoluene, diphenyl sulphide and 1,2,4,5-tetrabromobenzene.

Claim 20 (original)

The method according to Claim 1, wherein at least one of the diffusible additives increases the refractive index of perfluorinated polymers and is selected from the group consisting of: N-pentafluorophenyldichloromaleimide, octofluoronapthalene, and pentafluorophenyl sulfide.

Claim 21 (original)

The method according to claim 1, wherein at least one of the diffusible additives decreases the refractive index of organic polymers and is selected from the group consisting of: tributylphosphate, triethylphosphate, glycerol triacetate, methylperfluorooctanate, and perfluoro2,5,8-trimethyl-3,6,9-trioxadodecanoic acid methyl ester.

Claim 22 (original)

The method according to claim 1, wherein at least one of the diffusible additives decreases the refractive index of organic polymers and is selected from the group consisting of: perfluoropolyether, perfluorotrihexylamine, and perfluoropentadecane.

Claim 23 (original)

The method according to claim 1, wherein at least one of the diffusible additives decreases the refractive index of organic polymers and is selected from compounds with a methacrylate or acrylate functionality and a perfluorinated unit.

J:\NAN\105XC1\Amendment #1.doc\DNB/gjd

PAGE 8/13 * RCVD AT 8/2/2004 6:34:12 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-1/0 * DNIS:8729306 * CSID:352 372 5800 * DURATION (mm-ss):07-20

Claim 24 (original)

The method according to claim 1, wherein said plastic optical transmission medium has a glass transition temperature in excess of 90°C at all radii.

Claim 25 (original)

The method according to claim 1, wherein said plastic transmission medium is able to operate with stability at temperatures up to 85°C.

Claim 26 (original)

The method according to claim 1, wherein said plastic optical transmission medium is a graded index plastic optical fiber having a glass transition temperature at all radii greater than 85°C.

Claim 27 (original)

The method according to claim 1, wherein said plastic optical transmission medium is a graded index plastic optical fiber having a numerical aperture greater than 0.1.

Claim 28 (original)

The method according to claim 1, wherein said plastic optical transmission medium is a graded index plastic optical fiber comprising perfluorinated polymers and perfluorinated low molecular weight compounds.

Claim 29 (currently amended)

The method according to claim 1, further comprising inducing cross-linking in the polymeric material of the polymeric tube.

Claim 30 (original)

The method according to claim 29, wherein said cross-linking is accomplished by exposing the plastic optical transmission medium to ultra-violet radiation.

Claim 31-38 (canceled)

J:\NAN\105XC1\Amendment #1.doc\DNB/gld